PGI Accelerator Fortran/C/C++ Compilers for OpenPOWER+Tesla

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High-Performance Computing (HPC)

- Weather forecasting, climate modeling, engineering, life sciences, high-energy physics, oil & gas, signal processing, ...

- Continually evolving custom applications
  - Written primarily in Fortran, C and C++
  - Parallelized for scalable clusters of multi-core servers and GPUs using MPI, OpenMP, CUDA and OpenACC

- Hundreds or thousands of multi-core and GPU-enabled servers on a dedicated network
PGI Customers – Leaders in HPC
PGI: World-class Multicore Compilers

System: 2 x Intel(R) Xeon(R) CPU E5-2698 v3 @ 2.30GHz (32 cores, 64 threads total) 128GB memory
SPECompG_base2012 relative performance as measured by PGI during the weeks of Feb. 1 and Feb. 15, 2016.
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PGI OpenACC: Accelerating HPC Applications

Environment
- COSMO · NIM · ACME
- SAMI · FV3 · COAMPS

Chemistry
- GAUSSIAN · LS-Dalton
- VVM · NekCEM

Physics
- CloverLeaf · GENE

CFD
- Fun3D · Fluent · HiSTAR
- INCOMP3D · NUMECA

Applications-driven Accelerator Features

OpenACC for Performance Portability

Continuous Performance Improvement

System: Intel(R) Core™ i7 3930K CPU @ 3.2 GHz (6 cores total) 16GB memory with NVIDIA Tesla K40c GPU @ 745 MHz. SPECaccel_acc_base relative performance as measured by PGI during the weeks of Feb. 15, 2016. SPEC ACCEL™ is a trademark of the Standard Performance Evaluation Corporation (SPEC).
PGI Fortran/C/C++ for OpenPOWER+Tesla

- Feature parity with PGI Compilers on Linux/x86+Tesla
- OpenMP, OpenACC, CUDA Fortran, NVCC host compiler
- Integrated with IBM’s optimized LLVM/OpenPOWER code generator
- Beta release in H1 2016, production release later in 2016
Porting an 800K line HPC Application from x86 to OpenPOWER

Recompile ...

Run ...

WRF 3.5.1 Performance
PGI 16.1 vs GNU 5.2

X86 CPU: Intel Xeon E5-2698 v3, 2 sockets, 32 cores total
POWER CPU: IBM 8247-42L POWER8E, 20 physical cores total
GNU version 5.2; PGI version 16.1
Porting to OpenPOWER with PGI

- **HPC End-users and ISVs**
  - Validate with PGI compilers on Linux/x86+Tesla today — an easy first step to Linux/OpenPOWER
  - Participate in PGI Beta Releases for OpenPOWER+Tesla

- **HPC Centers** — A detailed PGI on Linux/OpenPOWER roadmap is available under NDA

- **HPC System Builders** — PGI is ready to partner on optimizing compiler solutions for your Linux/OpenPOWER HPC products

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